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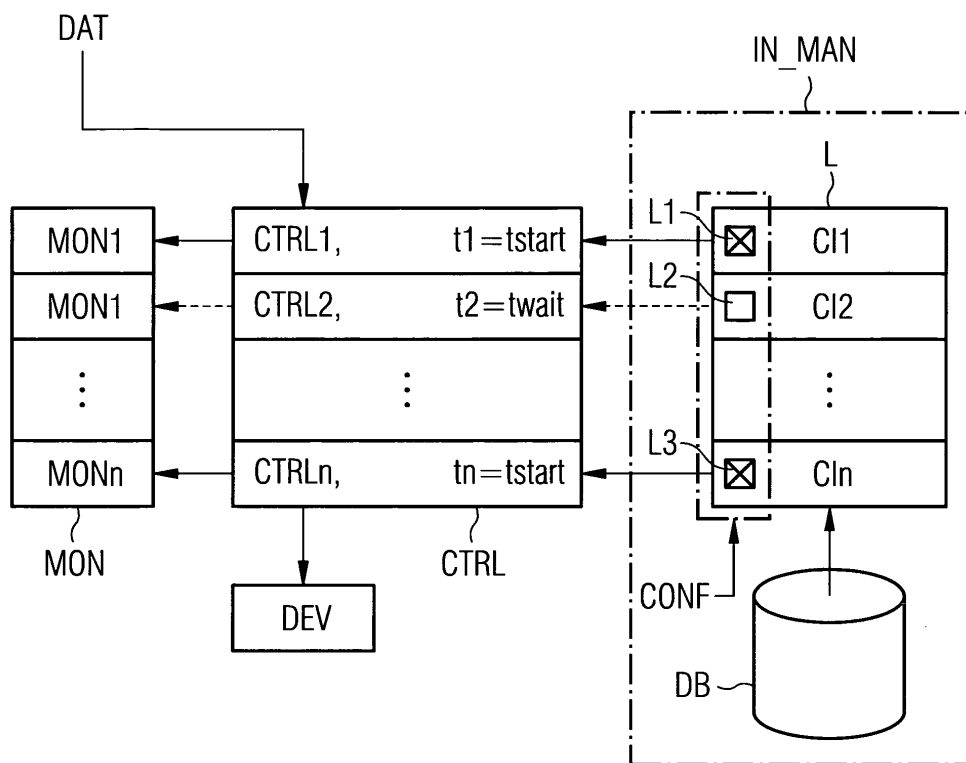
(54) Module for controlling integrity properties of a data stream

(57) A module for controlling integrity properties of at least a data stream inputted in a device like a machine for manufacturing purpose or a management system related to such machines is presented, comprising:

- a plurality of control items that are registered in a database,
- at least one activable control means that executes a control of one integrity property according to at least one of registered control items,

- a list attached to the database with selectable links for activating at least one of the control means,
- configuration means that perform on at least one of the links a chronologically selection according to a predefined management profile on integrity properties of the data stream in order to introduce a selectable relative time delay between activations of control items.

Due to that configuration, the obtained integrity control is provided with high reliability as well as in a very flexible manner.



Description

[0001] The invention relates to a module for controlling integrity properties of a data stream according to claim 1.

[0002] Especially in a system, for example a management system for manufacturing machines in a production line or for any processes, wherein a huge amount of data is collected from external applications or interfaces of machines, there is a need to ensure a sufficient integrity (or soundness) of properties of these data in order to avoid fatal errors or lost of time. Integrity defects can arise from many sources of collapse, for example by a lack of or failed information in the data, by a failed synchronization of data streams, by a lost of a communication path for data stream, etc.

[0003] For checking the integrity of such collected data streams according to a well defined processing of these data two basically approaches are well known.

[0004] The first approach can be defined as a "strict" approach, whereby, if control means for said integrity of data detect a deficiency, these data are rejected, that means they are not considered or saved for a further processing. Such a rejection can be compensated by means of a so called normalized database or key cross tables that evaluate/compensate constraints by a lack of integrity.

In many cases this "strict" approach is totally satisfying. In fact, in many cases, a missing data can be easily retrieved and re-inserted so that attached operations over the system are not time critical, for example in case of typical office automation contests or typical customer management application, wherein somebody has to insert only relevant data related to a person missing in its database, but will have all the time to insert the person first and then complete other of his data latter, because these last data are not disturbing considerably a processing.

[0005] The "strict" approach is not always satisfying, for example in case of a system for management of clinical registration, wherein many people are waiting in a queue before being "accepted" to a special medical care area. In this case, a lack of integrity in persons' data can present heavy consequences. Another case concerns a logistic/manufacturing environment for which one some runtime situations can be extremely critical, for example if a workflow in the logistical chain has to be stopped, because a usual identification code of container to be loaded has unfortunately not been retrieved over a database of identification codes, so that the loading chain has to completely interrupted.

[0006] In another words the right approach depends on boundary conditions related to data models and to requirements of the system of management of these data.

[0007] Hence even a second "loose" approach by a lack of integrity (for example by omitting a missing data on a processed product) can also be an alternative to the "strict" approach, but can lead to some unpredicted risks

that a system of management has not completely prevented before said lack of integrity happens. For example, it can be very complex for a production engineer to define and ensure a product definition by means of boundary conditions for raw materials if some of said raw materials are not yet available from a material depot and processes involving these raw materials are however going on.

[0008] One goal underlying to be achieved is to be seen in providing a module for controlling integrity properties of a data stream which provides a maximal reliability.

[0009] A preferred embodiment of the invention is presented over claim 1. Further advantageous embodiments of the invention are also presented in a set of dependent claims.

[0010] One way the goal is achieved is in providing a module for controlling integrity properties of at least a data stream inputted in a device like a machine for manufacturing purpose or a management system related to such machines, comprising:

- a plurality of control items that are registered in a database,
- at least one activable control means that executes a control of one integrity property according to at least one of registered control items,
- a list attached to the database with selectable links for activating at least one of the control means,
- configuration means that perform on at least one of the links a chronologically selection according to a predefined management profile on integrity properties of the data stream in order to introduce a selectable relative time delay between activations of control items.

[0011] Each control item comprises a check order/command of an integrity property that is bounded to a possible critical point, for example based on a requirement of a manufacturing step in a production line. This critical point can be for example provided by use or by experience of a previous "strict" or "loose" approach but is managed/activated in a more reliable manner by means of said attached activable control means. This aspect provides a more flexible degree of freedom for the management of control items and hence more safety/security in terms of reliability for controlling the integrity properties of data related to each control item.

[0012] It is hence possible to generate specifically lists of a critical point to be controlled in a selectable manner, preferably over a chronologically selection according to a predefined management profile on integrity properties of the data stream. By this way even if a high number of integrities has to be checked in a very complex management system, a sub-hierarchy of control items is easily and dynamically definable as relevant checkpoints in a very focused manner for a processing and allows a simple actualisable of control items for example if said sys-

tem or its subsystems are updated. In another words the present invention increases the reliability for controlling integrity properties in terms of flexibility compared to a "strict" approach and in terms of selectivity compared to a "loose" approach.

[0013] One further advantageous aspect is provided by introducing variables relative time delays between activations of selected control means that "triggers" control items. This aspect allows to sharpen the control of integrities to be checked if delays are set to zero or short duration.

At the opposite, such a delay can be set on a higher or an infinite value, at least until a set of new latter selected control means are selected, so that a "permissible" lack of integrities can be regarded as acceptable during said delay. "Acceptable" means here as far as the lack of integrity does not affect a process in a negative way until the end of the delay.

In resume, according to reliability requirements the relative time delay follows a triple choice switching model depending if its value is set on zero (high required reliable), on a positive fixed amount (middle required reliability) or on an infinite value (low required reliability).

[0014] Especially by choosing a positive relative time delay it means that a control means will not be provided at a usual time of a typical control of the device in which a data stream is inputting. Without any interruption of data stream, an operator that controls the device as well as other possible processes from other devices can hence delay said control of the device at his convenience. This presents a great operating flexibility of control especially if a high number of interacting devices and related processes are running at same time intervals. Even if constructors of these devices recommend to check some items at defined processing time of said devices, the operator has the possibility over the module of the invention to re-arrange a customized time schedule of activating these control items according to effective chronologically essential constraints on the integrity.

[0015] It can be also very advantageous to set a time delay on an infinite value for switching off selectively at least one of activable control means, if for example for the management of a production line a newly intermediate maintenance operation or an updating of a subsystem has to be performed so that a selective part of possible control items and their related constraints can be chronologically actualized or completely modified. The configuration means of selective time delaying provide hence a very dynamically way for adapting the management of complex systems according to the invention.

[0016] The described module according to the invention is further explained by the following example and drawing, whereby:

Drawing 1 shows a schematic overview of a module for controlling integrity properties of at least a data stream inputted in a device.

[0017] Drawing 1 presents a schematic overview of a possible module for controlling integrity properties of at least a data stream DAT inputted in a device DEV (for example a unit of a production line for a manufacturing process), comprising:

- a plurality n of control items CI1, CI2, ..., CIn that are registered in a database DB,
- at least one activable control means CTRL1, CTRL2, ..., CTRLn that executes a control of one integrity property at a data DAT input of device DEV according to at least one of registered control items CI1, CI2, ..., CIn,
- a list L attached to the database DB with selectable links L1, L2, ..., Ln for activating at least one of the control means CTRL, CTRL1, CTRL2, ..., CTRLn,
- configuration means CONF that perform on at least one of the links a chronologically selection according to a predefined management profile IN_MAN on integrity properties of the data stream in order to introduce a selectable relative time delay twait between activations of control items.

[0018] According to the schematic of drawing 1, the list L is connected to the database DB in order to extract some control items contained in the database DB. It is also possible to update the database DB with new added control items over the list L that is advantageously monitorable in an editable manner for a user responsible of the control of the integrity of data inputted to device DEV.

[0019] In a preferred embodiment of the invention, each user selectable link L1, L2, ..., Ln is encapsulated in a predefineable management profile IN_MAN of a control process by means of a binary switch in front of a corresponding control item CI1, CI2, ..., CIn of the list, ideally over a user interactive menu sheet on a monitoring device wherein binary switches are activable over buttons or software based toggles. In the present example, both links L1, Ln for the control items CI1, CIn are activated in a same menu sheet of the management profile IN_MAN, that means without adding at a user side a relative time delaying between them for a procedure of control. A relative delay between these both control items can be however intrinsically defined from a device side. In opposite the control item CI2 has not been actively selected, so that for the present menu sheet of the management profile IN_MAN this control items has been actively configured to be delayed in time relative to both previous control items CI1, CIn. Further configuration means in addition to the selectable links L1, L2, ..., Ln are not represented in drawing 1. They can comprises the values of time delays or other assertions or results' status for a specific control item that has to be delayed from a positive time amount relative to another one (s).

[0020] The control means CTRL comprising selectable

control sub-means CTRL1, CTRL2, ..., CTRLn, each one associated to a possible control item CI1, CI2, ..., Cn, can be part of an input of device DEV for the data stream DAT. The control means is therefore controlled from the management profile IN_MAN which is executed from user side or from an automatically command process. Each control item CI1, CI2, ..., Cn provides hence an activation of at least one of corresponding control means CTRL1, CTRL2, ..., CTRLn at a selected start time tstart or defines a time delaying twait of said activation. In the present example, a first and second activation time t1, tn are set on tstart for first and last represented control means CTRL1, CTRLn as well as a third activation t2 is timely delayed with delay twait for second represented control mans CTRL2.

[0021] Monitoring means MON1, MON2, ..., MONn are connected to the control means CTRL1, CTRL2, ..., CTRLn for monitoring possible assertions on integrity like for emitting an alarm by a lack of an integrity. These monitoring means can also be embedded in the management profile sheet IN_MAN that works interactively with a user.

[0022] After passing the control means CTRL at the time tstart, the data stream DAT is inputted in the DEV that executes a further processing only if (according to the present example) at least both first and last control means CTRL1 and CTRLn are not signalling a lack of integrity at the same time tstart and even if second control means CTRL2 signals a lack of integrity during the relative time interval [twait-tstart].

[0023] According to this example the time delay twait can be set on a infinite value for switching off selectively at the activable control means CTRL2. This can be advantageous of the corresponding control item CI2 has no more relevance in terms of integrity because a manufacturing process has been modified so that the control item CI2 is permanently secured or is no more to be considered at this step of manufacturing process.

[0024] Configuration means CONF performs the chronologically selection/activation of the control means CTRL1, CTRL2, ..., CTRLn by means of at least one of logical assertions on a predefined number of selectable links L1, L2, ..., Ln. The activable control means CTRL1, CTRL2, ..., CTRLn which are connected to monitoring means MON1, MON2, ..., MONn exit a positive or negative output signal (binary signal TRUE/FALSE) if a full integrity of data over the selected logical assertion is monitored at a present time tstart or not.

[0025] In a preferred embodiment of the invention, a plurality of logical assertions with different set of selected links L1, L2, ..., Ln are pre-definable in order to be monitored over successive time delays. In another words, a certain kind of integrity can be advantageously detected by means of putting one or more time delays on one or more selected links L1, L2, ..., Ln. This approach consists in providing a plurality of under-profiles of a main management profile IN_MAN using a plurality of chronologically delayed masks of links for defining a strategy of controlling specific integrity properties.

[0026] In a preferred embodiment of the invention, the module for controlling integrity properties of at least a data stream DAT inputted in a device DEV can be realized as an input/output interface of the device DEV with an output of passing data stream DAT and an input for said data stream DAT as well for the command signals from the list L and associated links to the control means CTRL.

[0027] Another form of module parts can be realized as a software platform wherein:

- the configuration means CONF for defining/selecting schedule of activation for the links L are embedded in a software application like a menu with selectable toggles of parameters;
- the list L, the database DB and the selectable links L1, L2, ..., Ln are edit-able and monitor-able over am interactive user interface.

The whole module can be also embedded in a software platform on which the data stream is inputted and alarms from the software control means CTRL or their software monitoring means MON1, MON2, ..., MONn are outputting signals that permit or block some further processes whose integrity's requirements are or are not ensured at a certain time.

Claims

1. Module for controlling integrity properties of at least a data stream (DAT) inputted in a device (DEV), comprising:
 - a plurality (n) of control items (CI1, CI2, ..., CIn) that are registered in a database (DB),
 - at least one activable control means (CTRL1, CTRL2, ...) that executes a control of one integrity property according to at least one of registered control items,
 - a list (L) attached to the database with selectable links (L1, L2, ..., Ln) for activating at least one of the control means,
 - configuration means (CONF) that perform on at least one of the links a chronologically selection according to a predefined management profile (IN_MAN) on integrity properties of the data stream in order to introduce a selectable relative time delay (twait) between activations of control items.
2. Module according to claim 1, wherein the time delay is infinite for switching off selectively at least one of activable control means.
3. Module according to claim 1 or 2, wherein the configuration means performs the chronologically selection by means of a logical assertion on a predefined

number of selectable links.

4. Module according to claim 2, wherein the activable control means (CTRL1, CTRL2, ...) are connected to monitoring means (MON1, MON2, ..., MONn) with a positive output signal (TRUE) if a full integrity of data over the selected logical assertion is monitored at a time (tstart). 5
5. Module according to claim 4, wherein a plurality of logical assertions with different set of selected links are pre-definable in order to be monitored over successive time delays. 10
6. Module according to one of the previous claims, wherein: 15
 - the configuration means (CONF) are embedded in a software application;
 - the list (L), the database (DB) and the selectable links (L1, L2, ..., Ln) are edit-able and monitor-able over an interactive user interface. 20

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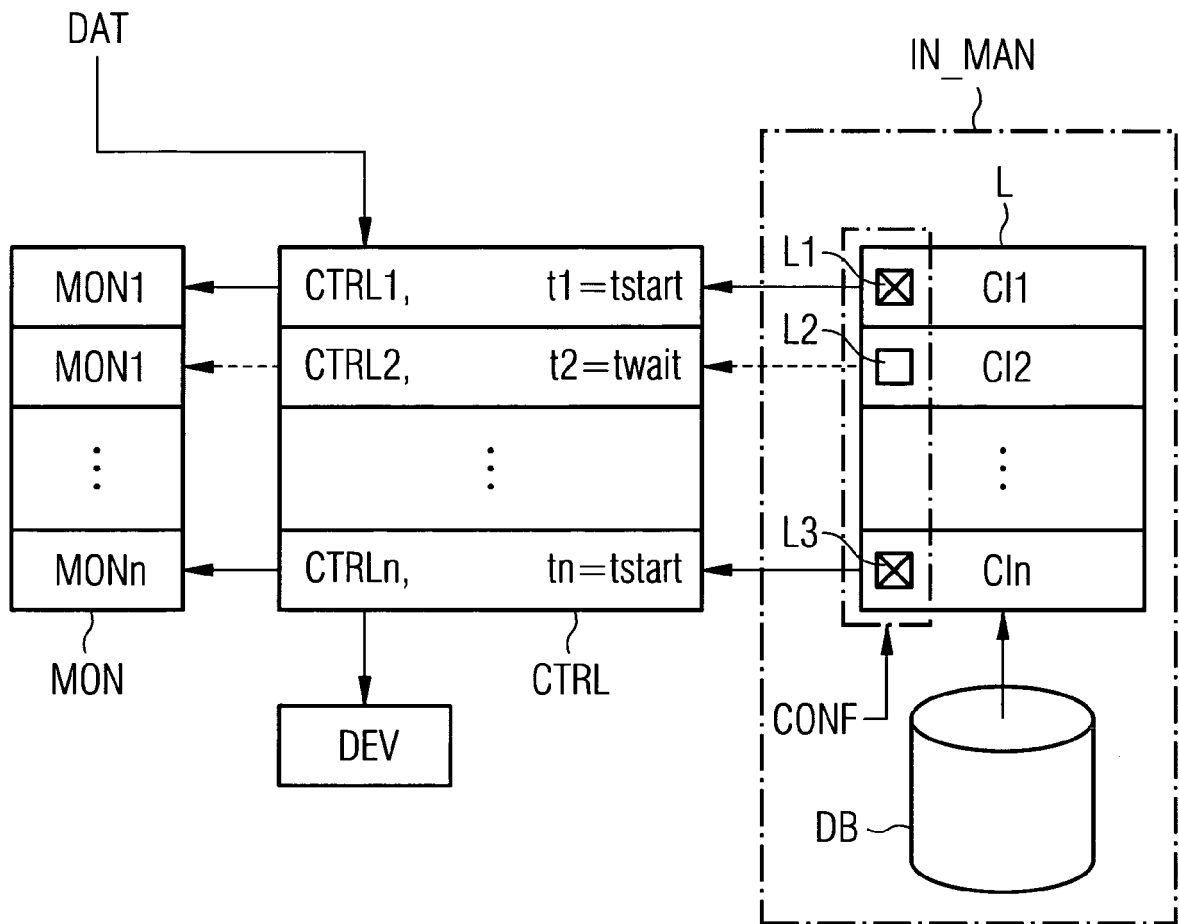
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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 02 0681

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2003/217133 A1 (OSTRUP NILS PETER [SE] ET AL OSTRUP NILS PETER [SE] ET AL) 20 November 2003 (2003-11-20) * figure 1 * * page 2, paragraph 11 - paragraph 13 * * page 3, paragraph 25 * * page 4, paragraph 39; figure 5 * * page 4, paragraph 41 - page 5; figure 6 *	1-6	INV. H04L1/24 ADD. H04L1/00
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			TECHNICAL FIELDS SEARCHED (IPC)
			H04L
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 March 2008	Examiner Kazaniecki, Daniel
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 02 0681

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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20-03-2008

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